Jun 5th, 12:00 AM

Changing trends in scholarly communication: issues for technological university libraries

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CHANGING TRENDS IN SCHOLARLY COMMUNICATION: ISSUES FOR TECHNOLOGICAL UNIVERSITY LIBRARIES

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Throughout history libraries have always been a link in the chain of the scholarly communication process. They have played a vital role in preservation, organization and providing access to the records of scholarly activities. This historical role of libraries, and also the paradigm of scholarly communication, has gradually been effected by two main factors. One is the tremendous growth, since the end of World War II, of published information, with ever rising prices (especially in the last 15 - 20 years) which has had a major impact on the ability of libraries to keep up with their acquisitions function and on their role as providers of information. The second factor is the emergence and development of electronic information technologies which make it possible to envision new and different ways of organizing collections and services that libraries have traditionally provided.

The scholarly communication system is fittingly described by Charles Osburn: "Scholarly communication behaves as a system, that is, a group of components that are influenced by each other as well as by the group's environment, each component serving as the environment of a subsystem. Major components of the scholarly communication system are the scholars and scientists who initiate communication, publishers, librarians, and the scholars and scientists who receive that communication[1]" (figure 1).

The academic community began to fear that a financial crisis was threatening the performance of research libraries and the viability of scholarly publishing. Fewer copies of scholarly books were being published, prices of books and journals were

escalating steeply, libraries' acquisitions budgets were falling far behind these increases, and the libraries were shifting expenditures from books to journals purchasing. These changes had a variety of effects on those involved in the scholarly communication chain[2].

Serial publications, particularly scientific journals, have seen price increases that, for example, in physics reached 82% between 1989 and 1993 and in engineering 71% for the same period. On average, over the last several years, the price of scientific periodicals has risen around 12% annually. At the same time, the total library expenditure, as a portion of university expenditure, has declined from 3.8% in 1979 to the current 3.1%.

This continuing acquisitions crisis has resulted in various actions. In most universities major serial cancellation projects have been underway. At the same time, the libraries have engaged the faculty in a dialog to address this problem. Among the ideas that received attention were efforts to encourage faculty to refuse publication in journals that increased their prices unreasonably; to review the promotion and tenure process (number of publications required); to explore the possibility of faculty retaining copyright; to increase cooperative activities with other libraries and the use of commercial services as an alternative to owning journals; to actively pursue the use of electronic means to deliver scientific information.

In the nineteenth century tradition held that library buildings would last forever and would house all books ever written, which would last forever as well. Another relic of the nineteenth century thinking was free access to print. All a scholar needed was to know what materials existed and where. In the twentieth century, information access improved via the use of the telephone, later the facsimile and by the invention of jet travel.

In the last ten or more years these conventions began to change. Budget constraints and the ever increasing cost of acquiring library materials lead to new developments: sharing of resources, greater reliance on interlibrary loan, and other means of providing access to information.

At the same time the rapid advent of electronic information technologies has made it possible to conceive new ways of accessing information. Until relatively recently computerization of library operations was mostly concerned with internal functions, automated circulation, cataloging and acquisitions. Now, electronic technologies provide access to secondary bibliographic resources as well as to primary information.

We are now talking about the electronic library, defined as the scholar and his/her workstation. The purpose of this workstation is to connect the scholar to the records of scholarship through local, national and international networks and to provide access not only to bibliographic information but also full-text, numerical databases and visuals. As Paul Evans Peters pointed out "The mission...is to improve information distribution and access by using high-performance computers and advanced networks to support research and education communication[3]".

Bibliographic information in electronic form on a more massive scale began to appear in the early 1970s. Two organizations in particular played an important role, the OCLC and RLG. The OCLC (Online Computer Library Center), founded in 1971, has a database of more than 24 million books and other materials held by almost 5,000 member libraries. This database is used by nearly 14,000 libraries in 46 countries for cataloging, reference and interlibrary loan. RLG (Research Libraries Group) was founded in 1975. In 1991 it had 112 members, mostly university libraries, independent research libraries and learned societies. Its bibliographic database, RLIN (Research Libraries Information Network) contains 50 million cataloging records for books, serials, maps etc.

Another type of electronic bibliographic information that became available commercially in the early 1970s was in the form of online abstracting and indexing databases. These started as a byproduct of the automation of the printed A&I services and have developed into quite sophisticated online products that, in some libraries, eliminated the need for the printed version.

A decade later the online public access catalogs (OPAC) started replacing the card catalog, and with the emergence of the Internet online catalogs of major libraries, became available to users. We are now in a period of transition. "What many envision, ultimately, is a situation in which the full range of information services and products would be available to the individual end-user at his or her own workstation: fully machine-searchable bibliographic services that abstract and index the existing printed literature; databases of primary material; the full, machine-searchable texts of works of analysis with primary material integrated with it through sophisticated windowing and hypertext functions (these would lead the reader to the entire literature and substantiating primary material on any point he or she wishes to pursue); downloading and print options that would permit the end-user to excerpt and reorder portions of the full range of material available and print it locally; flexible protocols for communicating among heterogenous systems, what one member of the library profession has called "systems with rich and varied access vocabularies [that address the] "individual needs, sophistication level and viewpoint of the user. One cannot know precisely where in the transition we presently are, though we are surely much closer to the beginning than the end[4]".

No matter how promising these new information technologies are, it is certain that information in printed form will continue to exist for a long time and that adequate bibliographic control is essential to scholarship.

As the chapter on Bibliographic Information in Electronic Form, in the Mellon report, concludes: "Relatively complete access to global bibliographic information is a critically important objective. Scholarly arguments based on thorough knowledge of the professional literature are at minimum better informed and obviously to be

preferred over those that are less firmly grounded. At the same time the cost to institutions of the services that provide access to such information should not be minimized. In an era of limited resources, difficult decisions will have to be made about possible tradeoff in acquisitions between traditional printed materials which will continue as the new information technologies are found to have ever more useful applications to scholarship. The argument is that providing scholars with readily accessible information about the existence and location of scholarly materials held elsewhere is in many respects a more important objective than building a free-standing, self-sufficient local collection."[4]

The information technologies that have attracted the most attention (hypertext, hypermedia, multimedia) make it possible to create, disseminate and utilize knowledge that goes beyond the automation of text and information processing. Also, new programs have emerged that show the potential to transfer scholarly communication - large networking research, multimedia programs, collections of electronic text in foreign languages, online journals etc.

Another technological advance is network-based imaging (via WWW and Mosaic or other navigational tools). Imaging is a digital representation of information (text, pictures and 3D objects) using computer and video technologies. Its two main objectives are preservation and access, including availability. Some image databases available on the Internet are Vatican Exhibition (Library of Congress), Soviet Archives (LC), NASA's Images, Images from the Smithsonian Institution. Selected Pilot Images projects are Denver Public Library's Conversion of High-Impact B/W Photographs, University of Michigan's Conversion of Michigan Dissertations, University of Southern California's Digitizing Color Slides for Use in the Classroom.

A further tool assisting users in the seamless and transparent access to different library catalogs/databases is the Z39.50 standard. The purpose of this standard is to help "hide" from the user the work involved in accessing retrieval and manipulation of data that comes from different systems. Two major advantages of Z39.50 are transparency

(users search other databases with the same screens and commands as their own system) and system independence (even when the user accessing a disparate system, as long as both adhere to the Z39.50 standard).

These technologies will gradually transform scholarly communication, "redefine the terms text, author and ownership, to eliminate the centuries-old concept of a fixed source of information and the accrual of clearly defined scholarly interpretation, to contribute to the reorganization of academic institutions, to render printed matter obsolete[5]".

Before all these changes can take place many obstacles and challenges will have to be overcome: financial and institutional support, obsolescence of hardware and software and, sometimes, the lack of understanding on the part of the users. Other problems will be the lack of A+I services online coverage of the literature before 1970 and a natural tendency of patrons to use only what is available in electronic form and ignore materials in printed form.

Another problem is the issue of information overload. The Internet offers an array of useful information services that cater to the traditional scholarly needs. At the same time there is also the problem of the Internet being filled with lots of garbage. As Charles McClure et al[6] found in a series of surveys, scholars have a clear aversion to online journals because "electronic information does not enhance one's status or image; in fact, it may very well harm them." As McClure further found, scholars seeking access to the Internet typically have only one piece of research in mind and do not want to take computer courses or even deal with systems people to learn how to get information. My personal experience with engineering researchers confirms that. Most of them claim that they do not have time to "navigate" through the Net, frequently they respond that's what they have their graduate students do and if they find something interesting they keep them informed.

According to Ekman and Quandt,[7] there are several issues that have to be resolved before we will be able to implement these new technologies: Will electronically distributed journals and books prove to be cost saving for libraries? What means of licensing, setting appropriate fees and payments for use of copyrighted materials, will be practicable? What are the economics of electronic publishing? What will be the demand for electronic publications at various price levels? What types of electronic transmission of documents will be used (ASCII, bitmapp ed, hybrid)? What effect will producing and distributing electronic scholarly information have on refereeing and peer review standards (increased incidents of plagiarism)? How will the integrity of an original text be guaranteed in an environment in which authors can modify their previously distributed papers? How will the archiving function be institutionalized? How much investment in current hardware technology is justified in light of the probable eventual obsolescence? How will electronic journals be priced? For example, will the pricing reflect the custom of software vendors to lower the unit price substantially as more users are licensed to use the product within an organization?

Larsen[8] describes and illustrates some of the changes that will most likely take place. In the present system, figure 2, the public services of the library bring information services directly to users, employing networking to improve their efficiency and effectiveness in the library. But networking also has a strong role to play in the library's less visible though critical functions, which include collections management, acquisitions, cataloging and preservation. Figure 3 illustrates an arrangement where the libraries and their suppliers offer their service over a common network (Internet) accessible to the user. This collaborative information utility model will extend the reach of the user, the library and the information provider. Libraries in this model become information servers for a network built on client/server relationships.

What are the implications for technological university libraries and their users? Users and libraries will take full advantage of networks, networked information and other potential applications of information technology. But they must do it with some prudence, as Crawford and Gorman caution in their new book "Future Libraries: Dreams, Madness, and Reality." "For the Internet user, the problem is knowing the difference between swimming, surfing and drowning. The important factor is attitude. A swimmer who becomes obsessed with currency and completeness will soon drown. If the user finds that she or he no longer reads complete articles in an area, that is surfing - not necessarily a bad thing, but one that indicates relative priorities and relative awareness.

We envisage the successful scholar on the Net as both a swimmer and a surfer. Some surf too much - treating all books as being outdated by definition; ignoring all but the few leading journals in a specialty; or worse, ignoring all journals and relying only on preprints, electronic mail, and personal communications. It is conceivable that such an approach might work in a few disciplines but it meets no present scholarly standard. A balance of surfing and swimming serves most users well in their attempts to cope with the electronic chaos of today. Unfortunately, the tools for surfing and swimming effectively do not yet exist - we have no complete and accurate charts for the Sea of Information. We hope that such tools can and will be developed, and repeat our conviction that librarians are the most competent to develop them[9]". They will recognize the changing nature of scholarly research and communication and provide not only these tools but also a capacity to pursue distance learning, individual education and worldwide education. The research libraries of tomorrow will retain the best of the past and take advantage of the new technologies thus remaining central to management of scholarly communication for the foreseeable future.

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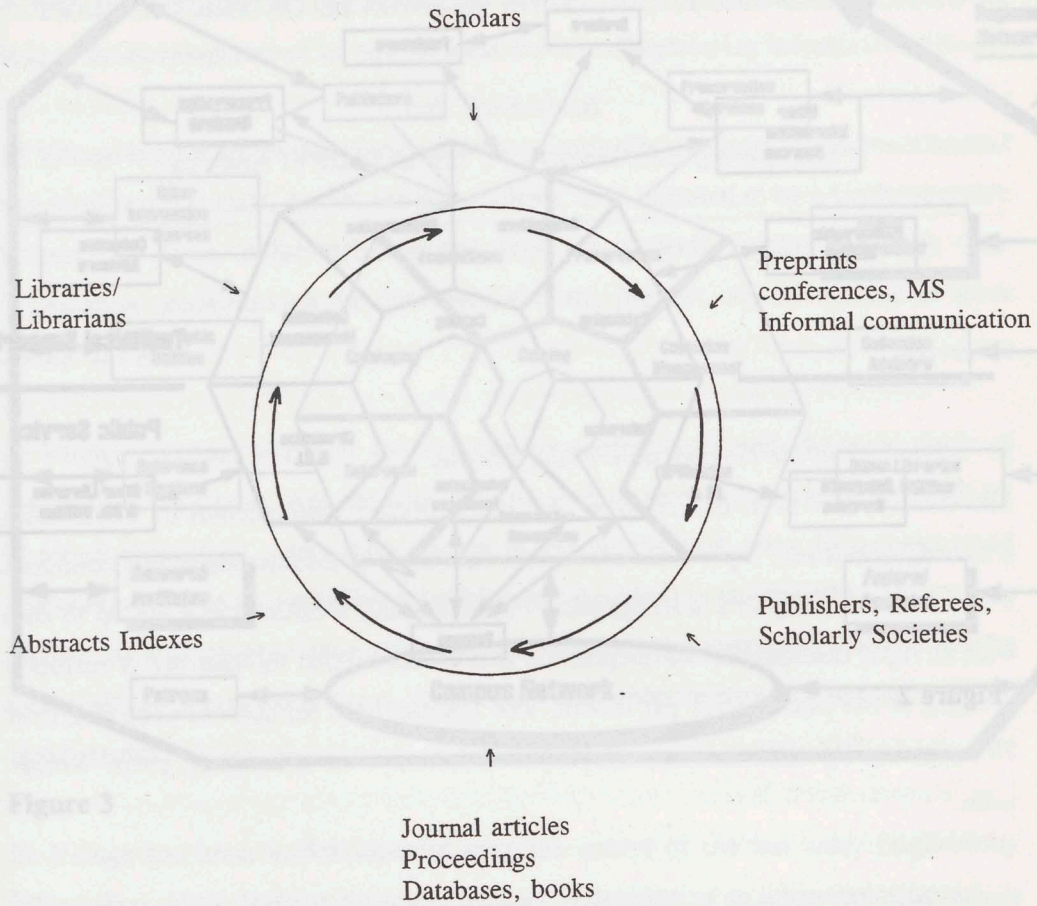
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Informal communication
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Figure 1

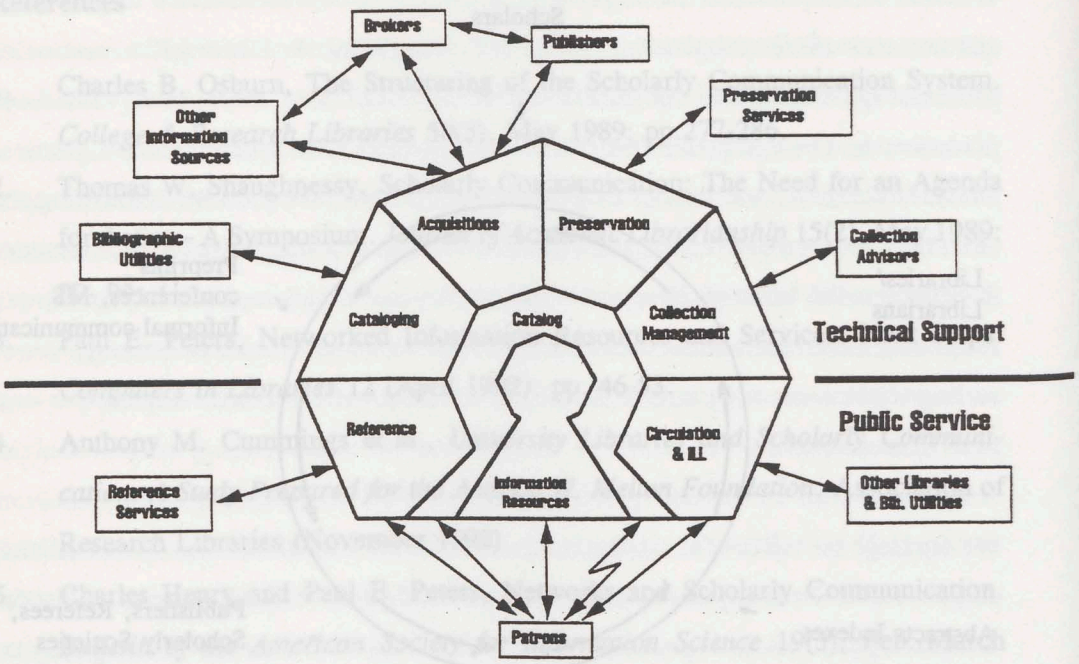
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Figure 2

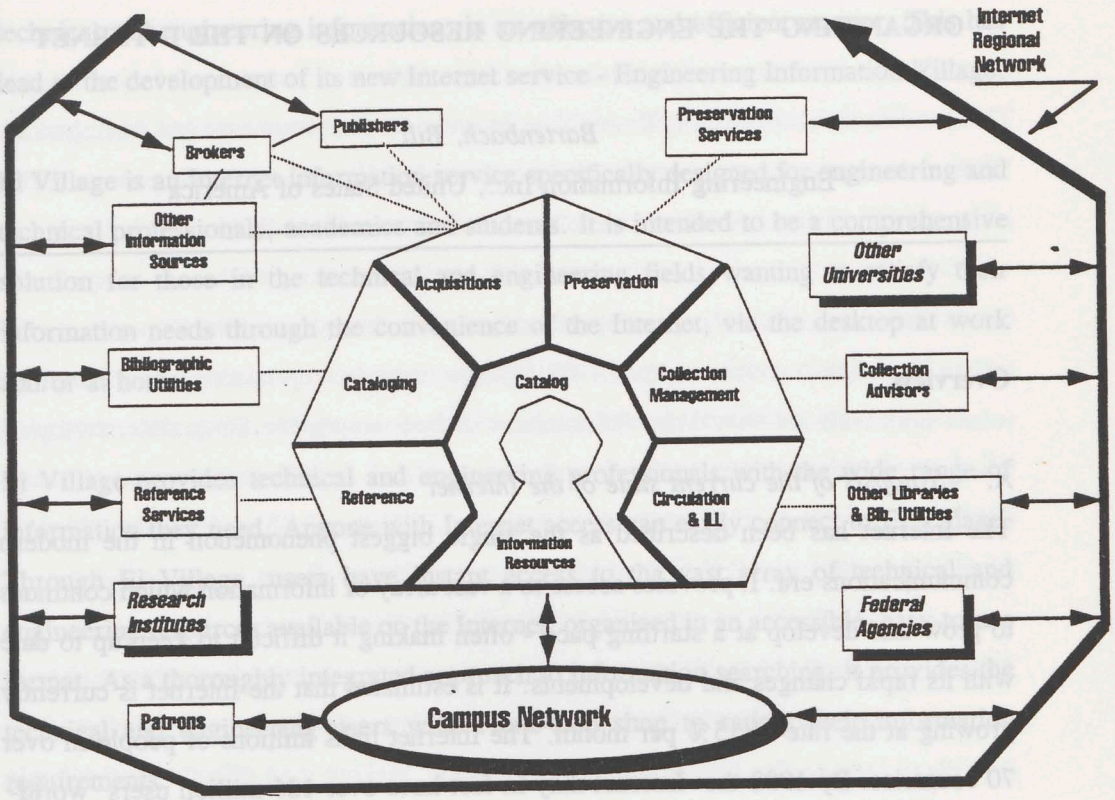
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Figure 3